Measuring Companies' Environmental and Social Impacts: An Analysis of ESG Ratings and SDG Scores

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Abstract

Environmental, social, and governance (ESG) ratings are central to sustainable investing and research but face criticism for inaccurately reflecting corporate sustainability performance. In response, new metrics have emerged that assess companies' impacts on the Sustainable Development Goals (SDGs). This paper compares four ESG ratings with two SDG scores, revealing no correlation between them. It then evaluates the alignment between these sustainability ratings and how investors and regulators assess corporate (un)sustainability. The findings show that SDG scores capture how these stakeholders judge companies' negative and positive impacts on sustainable development, while ESG ratings do not. This implies that SDG scores have high, and ESG ratings low, construct validity for assessing corporate sustainability performance. These results underscore that concepts like ESG, corporate sustainability, and company impact can be used complementarily but not interchangeably. The practical implication is that sustainable investors should prioritize sustainable development impacts next to avoiding ESG risks.

Keywords: Sustainable investing; sustainability ratings; ESG; impact investing; Sustainable Development Goals (SDGs); sustainable finance; EU Taxonomy; climate change

1. INTRODUCTION

Environmental, social, and governance (ESG) ratings have become highly influential. Investors use ESG ratings as one approach to creating sustainable investing strategies. Estimates suggest that some USD 30.3 trillion – equal to 24% of all assets under management – is now invested with some form of sustainability integration, whereby ESG integration is one of the dominant

approaches to sustainable investing (GSIA, 2022).[1] As a result, ESG ratings now affect markets. Studies have shown that changes in ESG ratings influence ownership of companies (e.g., Berg et al., 2022a; Hartzmark & Sussman, 2019; Pelizzon et al., 2021). Next to investment practice, ESG ratings are frequently used by researchers as a proxy for corporate sustainability performance. As Berg et al. (2022b) note, a growing number of academic studies, in fields such as finance and corporate sustainability, rely on ESG ratings. This makes ESG ratings important from a practical as well as an academic perspective.

Despite their prominence, ESG ratings have drawn criticism for inadequately measuring how sustainable a company is. For example, a list of top ESG-rated companies included British American Tobacco, Glencore, and Coca-Cola HBC, stirring an intense debate on the ESG rating's ignorance of these companies' adverse impacts (Verney, 2021). Such results led Bloomberg to speak of an *"ESG mirage"* (Simpson et al., 2021). The Economist (2023) dubbed ESG *"three letters that won't save the planet,"* and the Financial Times even proclaimed that *"the ESG investment industry is dangerous"* (Armstrong, 2021). Although these critiques largely remain anecdotal, empirical studies are investigating whether ESG ratings measure sustainability performance. For example, Busch et al. (2022) find that ESG ratings do not capture whether companies are improving their environmental performance. At the same time, pundits would counter that ESG ratings primarily serve to avoid risks from environmental, social, and governance factors (Amel-Zadeh & Serafeim, 2018), instead of measuring whether a company contributes to a better world.

Partly in response to such critiques, in recent years, various new metrics have been developed that evaluate different dimensions of corporate sustainability. Most prominent are scores that measure corporate contributions to the 17 Sustainable Development Goals (SDGs)

[1] For instance, ESG integration accounted for 71% of all sustainably invested assets in 2020. Although this number dropped to 18% in 2022, which was mainly caused by changes in methodology and reporting from US based investors, ESG integration was the second most prominent sustainable investing style in that year (GSIA, 2023).

(Bauckloh et al., 2024; van Zanten et al., 2023). As they specify universally shared and highly detailed sustainable development objectives (Pattberg & Widerberg, 2016; Stevens & Kanie, 2016; UN, 2015a), the SDGs can serve as a blueprint for measuring corporate sustainability performance and creating sustainable investing strategies (van Zanten et al., 2023). This resonates with demands for sustainable investing solutions. For instance, pension fund members want their investments to align with the SDGs, even if this could hurt financial performance (Bauer et al., 2021). Because SDG scores focus on the impact of companies on sustainable development, thus embedding an inside-out or 'impact materiality' perspective, they can enable such investment strategies and provide a complementary perspective to extant ESG ratings, which tend to gauge the influence of societies and the environment on the bottom line (outside-in/'financial materiality').

Researchers have started to investigate SDG scores in relation to ESG ratings. A recent study has found that the SDG scores of different rating providers are poorly correlated (Bauckloh et al., 2024), which is akin to the well-known lack of correlation between ESG ratings (Berg et al., 2022b; Billio et al., 2020; Dimson et al., 2020a; Kotsantonis & Serafeim, 2019). Furthermore, SDG scores do not appear to be influenced by a company's size, whether it is located in a developed or emerging market, or by a company's availability of sustainability disclosure resources (He et al., 2024). This contrasts ESG ratings, which are known to face size, location, and disclosure biases (e.g., Arminen, et al., 2018; Cai et al., 2016; Christensen et al., 2022; Drempetic et al., 2020; Dobrick et al., 2023; Gallo & Christensen, 2011; Ho et al., 2012). Moreover, whereas ESG ratings have limited relation to the involvement of companies in scandals, research indicated that corporate alignment with the SDGs is negatively associated with future controversies (Vasileva et al., 2024). Beyond these initial insights, little is known about the differences between ESG ratings and SDG scores.

This paper investigates SDG scores and ESG ratings along two dimensions. In the first dimension I explore how companies' SDG scores compare to their ESG ratings. To this end, I use SDG scores from two providers (Robeco and MSCI) and ESG ratings from four providers (Sustainalytics, Refinitiv, S&P, and MSCI). I find that the correlation between SDG scores and ESG ratings is low. Companies that rank in one quartile of an SDG score are virtually equally likely to end up in any of the four quartiles of an ESG rating, with comparable results across the ratings of different providers. Thus, many companies with good SDG scores receive poor ESG ratings, and vice versa. I furthermore assess the distribution of SDG scores and ESG ratings across sectors and regions. Whereas SDG scores reveal sectoral tilts, with energy companies in particular scoring poorly, ESG ratings typically are more evenly distributed across sectors.[2] In contrast, while SDG scores reflect a more similar distribution across geographies, ESG ratings reveal regional differences. Thus, there are substantial differences between ESG ratings and SDG scores.

In the second dimension, I analyze how well SDG scores and ESG ratings capture the positive and negative impacts of companies on societies and the environment. Yet this presents a challenge because the true level of corporate sustainability performance is near incalculable: companies generate numerous, diverse, and potentially conflicting impacts on societies and ecosystems, which spark indirect effects that together affect the resilience of social-ecological systems at varying local, national, and global levels (van Zanten & van Tulder, 2021). Defining the desirability and meaningfulness of such socioecological impacts is a politicized and plural endeavor (Leach et al., 2018), revealing multiple viable interpretations of how sustainable a company is. Unlike metrics such as corporate earnings, where analyst forecasts (ex-ante) can be compared with actual realized earnings (ex-post), gauging the validity of metrics like ESG

[2] The Sustainalytics ESG rating is an exception as it also shows sectoral tilts.

ratings and SDG scores lacks objective tests. It is therefore not surprising that most critiques of ESG ratings as measures of how sustainable a company is have remained anecdotal.

I approach this challenge by developing empirical tests that assess whether ESG ratings and SDG scores align with how relevant stakeholders judge companies' positive and negative sustainability impacts. If there is convergence between these ratings and how stakeholders evaluate a company's sustainability performance, then the rating enjoys better construct validity than where there is divergence between the rating and the opinions of stakeholders. I focus on two key stakeholders for which there is sufficient information on their views of corporate sustainability performance: investors and regulators.

First, to determine whether ESG ratings and SDG scores align with how investors evaluate corporate sustainability performance, I collect exclusion lists and identify holding companies of sustainable thematic funds. Exclusion lists, commonly published by asset owners, list companies that are excluded from the investment process due to their involvement in activities with negative environmental or social impacts, such as tobacco, thermal coal, or controversial weapons. In contrast, sustainable thematic funds finance companies offering solutions to specific sustainability challenges, such as energy, healthcare, or water. I test whether ESG ratings and SDG scores reflect investors' sustainability preferences, by assigning poor ratings to companies on exclusion lists and favorable ones to companies held in sustainable thematic funds.

Second, to evaluate whether ESG ratings and SDG scores align with regulators' views on corporate (un)sustainability, I use the EU Taxonomy regulation. This includes the regulation's 'do-no-significant-harm' (DNSH) principle, as well as the share of revenues that is derived from activities that the EU Taxonomy considers to contribute to climate change mitigation and adaptation. The tests determine whether companies violating the DNSH harm

principle receive poor ESG ratings and SDG scores, and those generating EU Taxonomy-aligned revenues get favorable ratings.

The results indicate that SDG scores do well on these tests. Companies that investors and regulators indicate as having a negative impact are associated with low SDG scores. At the same time, SDG scores for companies that are viewed as having positive impact receive high SDG scores. Hence, SDG scores capture both companies' positive and negative impacts as perceived through the views of key stakeholders. This contrasts ESG ratings. Notwithstanding small differences across the ESG ratings of different providers, ESG ratings are less able to distinguish between companies that investors and regulators deem sustainable and unsustainable.

I conclude that SDG scores have high, and ESG ratings low, construct validity as a measure of companies' current sustainability impacts. Furthermore, SDG scores enjoy discriminant validity compared to ESG ratings due to their lacking correlation. Based on these results, I assert that sustainable investors do well to prioritize positive sustainable development impacts beyond avoiding ESG risks. Sustainable investing solutions based solely on ESG ratings are unlikely to exclude companies with negative impacts or effectively finance those making positive environmental or social contributions, thereby increasing the risk of greenwashing. Nevertheless, I show that such concerns about using ESG ratings as a proxy for corporate sustainability performance can be overcome with SDG scores. This provides opportunities for advancing research on corporate sustainability and sustainable investing along the lines of the SDGs.

These findings contribute to the literature on ESG ratings and SDG scores, as well as the measurement of corporate sustainability performance. While this literature is rapidly expanding, it has been established that few research efforts have assessed methods of measuring the sustainability performance of investments (Drempetic et al., 2019; Kölbel et al.,

2020; Losse & Geissdoerfer, 2021; Popescu et al., 2021). This is a significant gap in the literature (Capelle-Blancard & Monjon, 2012; Diaz-Rainey et al., 2017; Revelli, 2017; van Dijk-de Groot & Nijhof, 2015). Researchers have consequently been called upon to investigate which types of indicators sustainable investors need in order to advance sustainability objectives (Drempetic et al., 2019), and how such metrics and their methodologies might be validated (Cort & Esty, 2020). This study responds to these calls and provides novel insights on the differences between ESG ratings and SDG scores, and empirically investigates the ability of these metrics to measure companies' societal and environmental impacts as expressed by investors and regulators.

The next section provides a background and develops hypotheses that guide the analysis of the extent to which SDG scores and ESG ratings measure companies' sustainability impacts. Section 3 introduces the data and explains the research methodology. Results are presented in section 4, followed by a discussion in section 5. The concluding section summarizes the findings and their importance.

2. BACKGROUND AND HYPOTHESES

Catering to a then-niche market, the earliest ESG ratings trace their history to the 1980s (Berg et al., 2022), providing input into investment strategies that incorporated normative concerns. Today, ESG ratings have become the dominant metric used to capture sustainability elements in investment practice and academic research (Berg et al., 2022; Fiaschi et al., 2020; Linnenluecke, 2022; Popescu et al., 2021; Scheitza et al., 2022).

Over time, the nature of ESG has changed. In its influential "*Who cares wins"* report, the International Finance Corporation (IFC) popularized the concept of ESG. In this report, the IFC aimed to enable *"market stakeholders to better integrate environmental, social and governance factors into capital allocation and portfolio management processes*", as this would "*support the growth of sustainable capital flows*" and *"contribute to the sustainable*

development of societies" (IFC, 2004:2). The global financial crisis gave further impetus to ESG as a tool for sustainability. Heightened concerns about the ethical conduct of companies and their accountability, amidst widening macroeconomic inequality, spurred interest in using ESG to both promote competitive advantage and support sustainable development (Galbreath, 2013).

Despite this early focus on sustainable development and the realization of sustainability outcomes, in the past decade ESG ratings have increasingly focused on measuring whether a company's financial performance might be influenced by environmental, social, and governance topics (Amel-Zadeh & Serafeim, 2018; Giese et al., 2019; Popescu et al., 2021). By measuring whether companies are exposed to ESG risks, and by gauging how well companies are positioned to manage them, investors may be able to improve their performance. Organizations such as the Sustainability Accounting Standards Board (SASB) developed corporate reporting standards for material ESG issues (e.g., Busco et al., 2020; Consolandi et al., 2020). This increased emphasis on the financial materiality of ESG issues has been argued to play a key role in mainstreaming sustainability in investments (Jebe, 2019).

A result of this transformation is increased ambiguity about the extent to which ESG ratings measure corporate sustainability performance. The evolution of sustainable investing led to the emergence of different concepts, such as ESG, sustainability performance, and impact. As the terminological boundaries between these concepts have become blurred, and since they are often used interchangeably, investors face the risk of greenwashing (e.g., Scheitza et al., 2022). Lacking correlation among the ESG ratings of different providers (e.g., Berg et al., 2022) contributes to the confusion. Moreover, the emergence of novel sustainability ratings that have a more explicit focus on 'impact' rather than financial materiality, like SDG scores (e.g., van Zanten et al., 2023), invites an investigation of different types of sustainability ratings and an analysis of their ability to proxy corporate sustainability performance.

The remaining part of this section develops hypotheses that help to discover whether ESG ratings and SDG scores align with stakeholders' perceptions of the sustainability performance of companies. I examine investors and regulators as they both judge wide samples of companies on their sustainability performance.

2.1 Investors: Assessing sustainability preferences revealed in investment strategies

Investors evaluate companies' sustainability performance in negative and positive ways. Actual sustainable investing strategies can be observed to identify companies that investors believe to be (un)sustainable. This approach is embedded in revealed preference theory, which rationalizes empirical observations of consumer choices and budget constraints to create utility functions (Samuelson, 1938; Houthakker, 1950).

First, various asset owners have exclusion lists that prohibit investment in companies with poor sustainability performance. Exclusion lists contain companies that are severely misaligned with investors' values, such as companies selling controversial weapons, violating human rights, or causing environmental destruction. Such negative screening is a popular sustainable investing method (GSIA, 2021) that has ancient origins in Judeo-Christian and Islamic traditions (Busch et al., 2016; Renneboog et al., 2008). For instance, the Quakers excluded investments related to the slave trade, US universities implemented divestment campaigns to challenge the Vietnam War and South African Apartheid, and, more recently, various institutional investors are divesting from fossil fuels in relation to climate change (for broader discussions, see Busch et al., 2016; Renneboog et al., 2008). Excluding companies from the investable universe limits opportunities for generating financial performance (e.g., Blitz & Fabozzi, 2017; Blitz & Swinkels, 2020; 2021; Dimson, et al., 2020b; Trinks & Scholtens, 2017). Consequently, exclusion is a rigorous measure that is reserved for the worst companies in the universe.

On this basis, I posit that exclusion lists reveal investors' negative sustainability preferences, listing companies that investors believe to be in conflict with sustainable development. I therefore hypothesize:

Hypothesis 1a: *Being listed on investors' exclusion lists is negatively associated with SDG scores and ESG ratings.*

Second, investors' actual investment decisions can be observed to deduce which companies they believe to be sustainable. Within the broad concept of sustainable investing, a distinction can be made between "buying impact" and "creating impact" (ESMA, 2023). The former indicates that an investor seeks exposure to impactful companies through buying a company's equity shares or credits. The latter indicates a strategy through which an investor itself aims to create sustainability impact, for instance by engaging with the investee company. Hence, "buying impact" refers to the company's impact, while "creating impact" refers to the investor's impact (Heeb & Kölbel, 2020). This distinction is useful because it suggests that companies that are holdings in investment vehicles that claim to invest in line with positive impact are perceived as sustainable by investors.

Investors offer diverse mutual funds or exchange traded funds that aim to invest in impactful companies. A clear example constitutes sustainable thematic investment solutions. Sustainable thematic investing is a popular and well established sustainable investing strategy (GSIA, 2022) that applies positive screening to allocate financing to highly sustainable companies related to a particular sustainability theme, like healthcare, energy, or water (e.g., Renneboog et al., 2008). Investors managing such funds identify companies that they believe are positively aligned with the sustainability challenge addressed by the theme. In this way, the theme associated with the fund guides the investment process. Consequently, the companies that these funds invest in can be seen as providing sustainability solutions, whereby the investor aims to "buy impact". This leads to the hypothesis:

Hypothesis 1b: *Being included in sustainable thematic investment strategies offered by investors is positively associated with SDG scores and ESG ratings.*

2.2 Regulators: Assessing alignment with the EU Taxonomy

In recent years regulators have increasingly passed regulations governing sustainable investing (Ahlström & Monciardini, 2022). Such regulations help define politically accepted definitions of corporate sustainability performance. The EU Taxonomy is a prime example.

The EU Taxonomy is a classification system for sustainable economic activities. It establishes technical screening criteria that determine the conditions under which the economic activities that companies undertake can be considered as environmentally sustainable. With this taxonomy the EU wants to support investors in channeling financing towards companies that help meet the EU's 2030 climate and energy targets and attain the European Green Deal, while also reducing greenwashing in the financial sector, and helping companies to become more environmentally sustainable (European Commission, 2022).

According to the EU Taxonomy, an economic activity is sustainable if it meets four conditions: (i) make a substantial contribution to one or more of six environmental objectives; (ii) do no significant harm (DNSH) to any environmental objectives; (iii) comply with minimum safeguards; and (iv) comply with the applicable technical screening criteria for (i) and (ii) (European Commission, 2021). These criteria help investors and companies determine the degree of sustainability of an investment, as is incorporated into the European regulatory framework.

The EU Taxonomy hereby offers a tool for testing the validity of ESG ratings and SDG scores from a regulatory perspective. On the one hand, it can be proposed that companies that are identified as causing significant harm to environmental objectives, which are thus violating the EU Taxonomy's DNSH principle, should receive poor ratings. On the other hand, companies that make substantial contributions to environmental objectives, while not doing

significant harm and complying with minimum safeguards and technical screening criteria, could be argued to deserve good ratings. Hypotheses 2a and 2b respectively explore whether SDG scores and ESG ratings align with these negative and positive impacts as transcribed in the EU Taxonomy regulation:

> **Hypothesis 2a:** *Being identified as causing harm to environmental objectives according to the EU Taxonomy regulation is negatively associated with SDG scores and ESG ratings.*
>
> **Hypothesis 2b:** *Generating revenues from activities that the EU Taxonomy regulation defines as environmentally sustainable is positively associated with SDG scores and ESG ratings.*

3. DATA AND METHODOLOGY

This section introduces the ESG ratings and SDG scores that are the focus of this study (3.1), the data that is used to test the hypotheses (3.2), and the empirical strategy (3.3).

3.1 SDG scores and ESG ratings

I use ratings of multiple providers due to the low correlation among SDG scores (Bauckloh et al., 2024) and ESG ratings (Berg et al., 2022; Dimson et al., 2020a) and because various ratings are prominent in practice and academia (Eccles et al., 2020). The SDG scores and ESG ratings were downloaded at the end of 2023, which matches the data on stakeholders' expressions of corporate sustainability performance (section 3.2).

SDG scores: I use SDG scores from Robeco and MSCI. The Robeco SDG score measures the extent to which a company is positively or negatively aligned with the SDGs. This score is created by determining corporate contributions through the SDGs as arising from the products or services that companies provide, through their operations, and from any controversies that the company may be involved in. The Robeco SDG score applies on a seven-point scale. Low, medium, and high positive scores (+1; +2; +3) indicate positive alignment with the SDGs.

Neutral scores (0) signal that a company does not have any significant contributions to the SDGs. And low, medium, and high negative scores (-1; -2; -3) suggest a company is harming the SDGs. Per company, Robeco offers 17 scores for each individual SDG. It also gives a total SDG score to a company. The total score is calculated through a so-called "min-max" rule: companies that have a negative score on any of the SDGs get the lowest (min) score to be its overall SDG score, while those with only neutral and positive scores get the highest (max) score as their total score. The Robeco SDG score is furthermore available for free (open access), thereby providing transparency (Robeco, 2022).[3]

I also use the MSCI SDG score. This score aims to assess companies' net contribution towards each of the 17 SDGs. Similar to the Robeco SDG score, it addresses alignment stemming from products and operations. The score ranges from -10 (strongly misaligned) to +10 (strongly aligned), with scores between -2 and +2 considered neutral (MSCI, 2024). MSCI only provides 17 scores for each SDG but it does not award a total SDG score to a company. I use the method of the Robeco SDG score to create a total MSCI SDG score for a company. Companies with a score between -10 and -2 on any of the 17 SDGs receive the lowest (min) score as their total SDG score. Those without a score between -10 and -2 get the highest (max) score as their total SDG score.

ESG ratings: I include ESG ratings of four providers.

First, MSCI's ESG rating measures how resilient a company is to long-term industry material ESG risks. MSCI explains that its ESG ratings aim to provide *"institutional investors with a more robust ESG integration tool designed to support ESG risk mitigation and long-term value creation"* (MSCI, 2021). The rating ranges from 1 (low) to 10 (high).

Second, Sustainalytics' Company ESG Risk Rating measures a company's exposure to and management of industry-specific and financially material, ESG risks. Sustainalytics

[3] See also: https://www.robeco.com/en-int/sustainable-investing/how-do-companies-and-countries-score-on-sustainability

explains that its ESG rating *"measures the degree to which a company's economic value is at risk driven by ESG factors"* (Sustainalytics, 2021). The score applies on a scale from 1 to 100 whereby lower scores are better. I reversed the scoring in order to align with the other ratings used in this study (the other ESG ratings all have scales on which higher ratings signal better performance).

Third, Refinitiv's ESG rating measures a company's relative ESG performance on a scale from 1 to 100. The rating accounts for industry materiality and company size biases, helping investors *"make sound, sustainable investment decisions"* (Refinitiv, 2021).

Fourth, S&P's ESG rating is built on the Corporate Sustainability Assessment (CSA; formerly RobecoSAM CSA). This evaluation focuses on industry-specific and financially material sustainability criteria. The rating comprises the financial and societal impact of ESG factors, and can be used *"as a KPI for sustainability-linked financing or to build thematic portfolios"* (S&P, 2021). The rating ranges from 1 to 100.

Total ratings. SDG scores and ESG ratings consist of sub-components. Robeco and MSCI deliver 17 sub-scores, one for each SDG. The ESG ratings can be decomposed into E, S, and G factors. In this study I use total SDG scores and ESG ratings rather than individual components. The motivation for this choice is theoretical and practical. First, corporate sustainability is a multi-faceted concept that involves dilemmas and trade-offs. Companies can exert both positive and negative effects on multiple environmental and social sustainability topics. To navigate this complexity, investors and researchers stand to benefit from a rating that presents an overall conclusion of a company's sustainability performance. Second, from a practical angle, investors will primarily focus on a single rating for a company, rather than steering on multiple ones (although there will be exceptions). This is supported by studies that show that investment behavior is influenced by changes in (total) ESG ratings (Berg et al., 2022a; Pelizzon et al., 2021).

Sample and standardization. The SDG scores and ESG ratings of different providers vary in terms of the number of companies that they cover. Total coverage of companies ranges from 7,601 (Refinitiv) to 9,219 (S&P). For the analysis I create an "intersection sample" of companies that have all six types of ratings available, hence removing companies that lack one or more ratings. This intersection sample spans 6,606 unique companies. Table 1 shows how the intersection sample, as well as each of the six ratings, are distributed across industries and geographic regions. This table underscores that the creation of the intersection sample led to a reduction in sample size relative to the data from individual providers. The number of companies covered by the Robeco SDG score and the ESG ratings of Sustainalytics and S&P dropped by around 27%, the MSCI SDG score and ESG rating have 15% less coverage in the intersection sample, and coverage of the Refinitiv ESG rating is 13% lower.

These reductions in sample size are relatively similarly distributed across industries and regions with a few notable exceptions. In terms of industries, Energy and Utilities companies have a relatively lower reduction in coverage (around 17% for the Robeco SDG score and the Sustainalytics and S&P ESG ratings; and around 9% for the MSCI SDG score and ESG rating and Refinitiv ESG rating). In terms of regions and relative to the data providers' original samples, Asian companies see a substantial reduction in coverage in the intersection sample (a 44% reduction for the scores by Robeco, Sustainalytics and S&P, a 28% reduction for the MSCI data, and a 21% reduction for Refinitiv ESG ratings), while companies from Oceania barely see a reduction (ranging from 0% to 3%). Table 2 provides statistical parameters for the intersection sample as well as each data provider's original sample, highlighting that the general distributions of SDG scores and ESG ratings do not substantially differ between these samples.

--- insert table 1 ---

The SDG scores and ESG ratings use different scales. To enhance comparability, in the main presentation of the results I z-standardize all variables. This is in line with Bauckloh et al.'s (2024) investigation of the correlation among SDG scores. Table 2 also shows the distribution of z-standardized SDG scores and ESG ratings for the original and intersection samples. The two SDG scores can be understood as ordinal variables, which may complicate z-standardization. For robustness, I therefore also conduct the analyses using non-standardized SDG scores and ESG ratings. In interpreting results, I also turn to the raw (non-standardized) scores, which helps to align with the messaging of the data providers.

--- insert table 2 ---

3.2 Stakeholders' revealed sustainability preferences

Below I explain how I identified companies that investors and regulators indicate to be (un)sustainable.

Investors: To test Hypothesis 1a, I collected exclusion lists from asset owners via the following process. First, I identified the largest asset owners in the world, measured by asset value, through the *Asset Owner 100* publication of the Thinking Ahead Institute (2022). To complement this list and expand the sample size, I also used the Investments & Pensions Europe's (IPE) *Ranking of Europe's top 1,000 pension funds* (2021). Second, I then visited the websites of asset owners on either of these lists with more than 10 billion USD in assets and downloaded the exclusion lists of the asset owners that published them. The exclusion lists were collected in the second half of 2023.

In total, exclusion lists of 28 asset owners were collected. Table 3 provides an overview, showing each asset owner's country, assets, and the number of stocks on their exclusion list as well as the types of topics that are excluded. Twenty-six of the asset owners come from Western Europe, with the remaining two hailing from Australia and New Zealand. This reveals geographic differences in terms of transparency about sustainable investing practices: whereas

many European and Oceanic asset owners publish their exclusion lists, no North American and Asian institutions appear to do so. The asset owners furthermore vary in size, ranging from 16 to 1,344 billion USD. In sum, these 28 organizations own around 4,285 billion USD, equal to 18% of the assets managed by the top 100 global asset owners at the end of 2022.

--- insert table 3 ---

There are a total of 2,698 companies on the exclusion lists of these asset owners. 1,103 companies lack identifying information that would enable the collection of SDG scores, ESG ratings, and company information. These were therefore dropped. The remaining 1,595 companies are unique companies but also contain vertically and horizontally related companies, such as parent and subsidiary companies. All companies that are affiliated with the same entity were removed except for the leading entity, to ensure the sample consists of unique companies. For example, five companies related to Brazilian beef producer JBS are found on exclusion lists (JBS SA, JBS, JBS Finance II Ltd, JBS USA Finance Inc, and JBS USA LLC). All except for the parent company (JBS SA) were removed. This led to a total sample of 690 companies.

Using this list, a binary variable was created that shows whether a company is excluded by four or more asset owners. This variable aims to indicate consensus about the negative sustainability performance of a company, of which 215 are flagged. Robustness tests using variations of this binary variable, such as being excluded by at least one asset owner, were conducted.

In order to investigate Hypothesis 1b, I analyzed holdings in sustainable energy, water and healthcare funds, as identified through Morningstar's fund database. These sustainability themes were chosen because they comprise relevant environmental and social dimensions of sustainable development that are well established in the sustainable investing industry. I then identified products that had at least a five-year track record. This criterion was selected to

identify sustainable thematic investment solutions that have been tested over time, thereby mitigating the risk that less credible solutions enter the analysis.

In total, 17 funds were selected (Table 4). The holdings of these funds at the end of 2023 were downloaded, which comprised a total of 1,082 investee companies. As different thematic solutions can invest in the same companies I removed duplicates, leading to 598 unique companies. Among these are 12 companies that also are excluded by four or more asset owners. This signals that investors are unsure about the sustainability performance of these companies[4]. These were dropped from the analysis.

--- insert table 4 ---

Regulators. I collected data on companies' alignment with the EU Taxonomy from Sustainalytics for the end of 2023.

In order to assess Hypothesis 2a, I use the Sustainalytics datapoint 'overall DNSH breach flag'. This metric gauges whether an individual company is breaching the taxonomy's DNSH principle. Thirty-three companies are flagged. Most of these companies are active in the materials (14 companies), industrials (6), and energy (6) sectors. The companies come from different markets, including India (8), China (6) companies, and the United States (5). I use this binary flag in the analysis, serving as an indication that a company is unsustainable in view of European sustainable finance regulation.

To assess Hypothesis 2b, I use the Sustainalytics datapoint 'overall percentage of aligned revenue'. This datapoint contains the percentage of a company's revenues that can be considered to be aligned with the EU Taxonomy's climate change mitigation and adaptation objectives. There are data for 3,754 companies. Across this sample, 1,476 companies have no EU Taxonomy-aligned revenues. What is more, 1,102 companies have more than 0% but less than 5% EU Taxonomy-aligned revenues. There are 532 companies with more than 33% EU

[4] These are all energy and utility companies that are involved, to varying extents, in renewables, while at the same time also having substantial fossil fuel (and particularly thermal coal) operations, or being involved in military contracting.

Taxonomy-aligned revenues, of which 293 companies generate over 66% of their revenues from activities in line with the EU Taxonomy. The average percentage of taxonomy-aligned revenues is 13%.

3.3 Empirical strategy

The empirical analysis consists of two parts: (i) a comparison of SDG scores and ESG ratings; and (ii) an exploration of the alignment between stakeholders expressions of corporate sustainability performance and SDG scores and ESG ratings as formulated by the hypotheses.

To compare SDG scores and ESG ratings, I evaluate three dimensions. First, I calculate Pearson correlation coefficients for each pair of ratings to analyze the degree of agreement between them. Second, I analyze the differences between SDG scores and ESG ratings in more detail through quartile match analysis. Each of the six ratings is divided into quartiles, which enables a comparison of how SDG scores are distributed relative to ESG ratings. More specifically, I calculate what share of companies present in each quartile of the Robeco and MSCI SDG scores is represented in each quartile of the ESG ratings of MSCI, Sustainalytics, Refinitiv, and S&P. Third, I explore differences in the distributions of SDG scores and ESG ratings across the economic sectors and geographic regions in which companies operate.

To test the hypotheses, I start by conducting a treatment-control comparison. I compute mean and median SDG scores and ESG ratings for treated samples. The treated samples contain companies that investors and regulators indicate to be (un)sustainable. This includes the companies flagged through a binary variable (i.e., companies that are on exclusion lists, that are included in sustainable thematic funds, and those violating the EU Taxonomy's DNSH principle). A new treated sample is created that contains companies generating more than 66% of their revenues from activities that the EU Taxonomy considers to be sustainable. As such, this sample is made based on a continuous variable and contains companies whose revenues are derived for the majority of sustainable products. Subsequently, I conduct t-tests to

determine whether the average scores of companies in the treated and control samples are significantly different. Moreover, I calculate Cohen's *d* to shed light on whether any differences are also economically meaningful. Cohen's *d* is a standardized measure of the difference between the means of two groups, expressed in terms of standard deviation.

Then, to more formally test the hypotheses, I employ the following Ordinary Least Squares (OLS) model:

$$Corporate\ Sustainability_i = \beta_0 + \beta_1 Stakeholder\ perception_i + \beta_2 Sector_i + \beta_3 Region_i + \beta_4 Size_i + \sum_{f=4}^{n} \beta_f\ Fundamentals_i + \epsilon \quad (1)$$

Where *Corporate Sustainability* is the company's degree of sustainability measured by the SDG scores and ESG ratings described in section 3.1. *Stakeholder perception* describes how (un)sustainable stakeholders perceive the company to be. In separate applications of the model, I use four types of stakeholder perceptions: (1) a binary variable that identifies whether a company is excluded by asset owners; (2) a binary variable that signals whether a company is included in sustainable thematic funds; (3) a binary variable that indicates whether a company is breaching the EU Taxonomy's DNSH criteria; and (4) a continuous variable that measures a company's percentage of revenues that is aligned with the EU Taxonomy.

I control for the *Sector* of the company, the *Region* in which the company is based, and the *Size* of the company proxied by its market capitalization. These controls were included because they are known to affect ESG ratings (e.g., Arminen, et al., 2018; Cai et al., 2016; Christensen et al., 2022; Drempetic et al., 2020; Dobrick et al., 2023; Gallo & Christensen, 2011; Ho et al., 2012). While SDG scores are less prone to size and location biases (He et al., 2024) they display sectoral tilts. Controlling for the sector in which a company operates is

furthermore important when testing alignment between SDG/ESG ratings and the EU Taxonomy, given that the latter is a sector-based screening.

Additionally, I include four variables relating to the company's *Fundamentals*, including a company's Earnings-to-Price ratio, Return on Invested Capital, Operating Profit Margin, and Leverage, to take the potential effect of a company's performance on ratings into account as well.

In the robustness tests I use other proxies for the company's region (i.e., its country of domicile, as well as whether its region is classified as a developed or emerging market), and its size (i.e., revenues, employees). Annex 1 summarizes the variables used in this study.

4. RESULTS

This section first compares ESG ratings and SDG scores. Then it discusses how both types of ratings perform on each of the hypotheses.

4.1 Comparing ESG ratings and SDG scores

The correlation between and among the ESG ratings and SDG scores is found to be low. Figure 1 shows the correlation coefficients between all pairs of SDG scores and ESG ratings. The SDG scores of Robeco and MSCI are only slightly correlated, with a correlation coefficient of 0.39. This result is in line with an earlier assessment of agreement between SDG scores (Bauckloh et al., 2024). Furthermore, there is low to moderate correlation between the ESG ratings of different providers, ranging from 0.31 to 0.67. This is similar to the results of Berg et al. (2022).

Additionally, the correlation between a company's SDG score and its ESG rating is low. This degree of relation ranges from -0.03 to 0.33. The SDG scores of Robeco and MSCI are uncorrelated with the ESG ratings of Refinitiv and S&P. They have very low correlation with the MSCI ESG rating, and a slight correlation with the Sustainalytics ESG rating. The

different ambitions of these ratings, i.e., measuring corporate contributions to the SDGs and evaluating ESG performance, thus manifest into diverging assessments. The differences between a company's SDG score and its ESG rating are greater than the divergence between the same type of rating of different providers.

--- insert figure 1 ---

Next to having low correlation, SDG scores and ESG ratings follow diverging distributions. This is illustrated by the quartile match analysis presented in Figure 2. In the figure, panels A and B respectively compare the Robeco and MSCI SDG scores with ESG ratings in terms of the proportion of companies that rank in any quartile of one SDG score versus the same quartile of any ESG rating. To illustrate, in panel A, of the companies that score within the first quartile of the Robeco SDG score, 31% rank within the first quartile of the MSCI ESG rating. The remaining 26%, 23%, and 19% score in the second, third, and fourth quartiles of the MSCI ESG rating, respectively.

--- insert figure 2 ---

On average, 25% of companies that rank within one quartile of the Robeco SDG score rank within the matching quartile of an ESG rating, whereby this percentage is similar across the four ESG ratings (ranging from 25% to 26%). This average percentage stands at 28% for the MSCI SDG score, which varies from 24% to 33% across the four ESG rating providers. Hence, a company that ranks in one quartile of an SDG score is virtually equally likely to rank in any of the four quartiles of an ESG rating (barring slight differences across ratings). Moreover, the proportion of companies that rank within the same quartile of an SDG score and an ESG rating does not exceed 40% (of the companies that rank within the first and fourth quartile of the MSCI SDG score, 40% rank within the first and fourth quartiles of the Sustainalytics ESG rating). Thus, the diverging distributions of companies' SDG scores and their ESG ratings are substantial and comparable across data providers.

ESG ratings and SDG scores furthermore are found to differ in terms of their distributions across economic sectors and geographic regions.

Figure 3 shows the sectoral and regional distributions of Robeco's and MSCI's SDG scores. There are notable sectoral tilts in both scores. The energy sector receives low SDG ratings from both providers. For instance, on its original scale of -3 to 3, energy companies get a median Robeco SDG score of -1. MSCI rates these companies even lower: a median of -10 on a scale from -10 to 10. Robeco gives good SDG scores to health care companies (median of 2) and relatively poor scores to consumer staples firms (median of -1). MSCI assigns poor SDG ratings to most utility companies (median of -2), with real estate and financials (medians of 2) scoring better. While the sectoral tilts in SDG scores are notable, they reveal rather similar distributions across regions. The median Robeco SDG score is 1 (for companies in Europe, North America, and Oceania) or 0 (for African, Asian, and Latin American companies). The median MSCI SDG score is 0.5 for companies in all regions.

--- insert figure 3 ---

Figure 4 shows similar sectoral and regional distributions for ESG ratings. First, whereas the ESG ratings of MSCI, Refinitiv, and S&P are quite comparable across sectors, the Sustainalytics ESG rating involves sectoral tilts. Sustainalytics assigns lower ESG ratings to energy companies (median of 67 on a scale from 1 to 100) and higher ratings to information technology and consumer discretionary (median of 81) and real estate (median of 85) companies. Second, the ESG ratings of all providers follow more dispersed geographic distributions. All ESG rating agencies give the highest median scores to European companies. Asian companies rank lowest in the ratings of MSCI and Sustainalytics. Refinitiv and S&P give the lowest median scores to North American companies.

--- insert figure 4 ---

A comparison between Figures 3 and 4 reveals differences between SDG scores and ESG ratings in terms of sectors and regions. SDG scores are influenced by the sector in which a company operates, but less so by the region in which it is located. In contrast, ESG ratings follow similar distributions across sectors (except for the Sustainalytics ESG rating) yet display stronger differences across regions.

The analysis presented here underscores that SDG scores and ESG ratings are substantially different. The question that is addressed next is whether these ratings align with how relevant stakeholders perceive the sustainability performance of companies.

4.2 Are SDG scores and ESG ratings aligned with stakeholders' sustainability preferences?

The treatment-control comparison indicates that SDG scores have better alignment with stakeholders' sustainability preferences than ESG ratings. Table 5 shows the average and median SDG scores and ESG ratings for companies in the treatment groups (i.e., companies that are excluded by asset owners, included in sustainable thematic funds, violating the DNSH principle of the EU Taxonomy, and those that generate more than 66% of EU Taxonomy aligned revenues) versus those of the control groups. It determines if the differences between the treatment and control groups are statistically significant through t-tests. The economic significance of any differences is estimated by Cohen's *d*. This measure is typically suggested to have a small, medium, and large effect with thresholds of 0.2, 0.5 and 0.8, respectively (see Cohen, 1988).

--- insert table 5 ---

The average and median SDG scores for companies that stakeholders indicate as having negative impact are lower, while those that are indicated as having a positive impact are higher, compared to the scores in the control groups. These results are statistically significant for both SDG scores and all four treatment-control groups. The Robeco SDG score shows economically

significant results for all four groups, as each value for Cohen's *d* is at least 0.8. The MSCI SDG score for companies with a negative impact is economically significant, but its score for companies with a positive impact has low (0.3) to medium (0.5) economic significance.

ESG ratings paint a different picture. The ratings of MSCI and Sustainalytics are somewhat lower for companies that are excluded and involved in DNSH violations, with moderate to substantial economic significance. These ratings are higher for companies included in sustainable thematic funds, with the MSCI and Sustainalytics ratings respectively having large and small economic significance. Neither ESG rating is substantially higher for companies with over 66% of EU Taxonomy aligned revenues. In the ratings of Refinitiv and S&P companies with negative impacts score better, albeit with low economic significance. Companies in sustainable thematic funds also have better ESG ratings by Refinitiv and S&P, which enjoys some economic relevance. Alignment with the EU Taxonomy is not picked up in these ratings.

The next sections explore the alignment between stakeholders' sustainability preferences and SDG scores and ESG ratings in more detail by presenting the results of the regression analysis.

SDG scores. The regression results confirm that the SDG scores have good alignment with stakeholder perceptions of corporate sustainability performance. Table 6 shows the outcomes of the regression analysis using SDG scores. Note that in the regression results the coefficients and the corresponding *t* values can be positive as well as negative. Positive [negative] values respectively indicate that a change in the predictor (i.e., the independent variables that denote a stakeholder's expression of corporate sustainability performance, as well as the control variables) is associated with an increase [decrease] in the independent variable (an SDG score or ESG rating). Significant negative values for the 'Exclusion' and 'DNSH violation' dimensions indicate that the corporate sustainability rating that is tested captures these negative

impacts, while significant positive values for the 'Thematic' and 'Taxonomy revenues' tests suggest alignment with companies' positive impacts.

--- insert table 6 ---

As shown in the table, the proxies for negative corporate impact – i.e., being excluded by investors' exclusion lists or being associated with DNSH violations of the EU Taxonomy regulation – are negatively associated with SDG scores. At the same time, the proxies for positive company impacts – i.e., being included in sustainable thematic funds and the percentage of revenues that is aligned with the EU Taxonomy regulation – display a positive association with SDG scores. All coefficients are statistically significant and remain so when including controls.

The results underscore the variation in economic significance between the two SDG scores. The Robeco SDG score is more strongly associated with companies being included in sustainable thematic funds (as a proxy for being perceived as sustainable by investors) and with companies that are flagged for DNSH violations under the EU Taxonomy (as a proxy for being perceived as unsustainable by regulators). The coefficients for these variables are nearly double in magnitude relative to the MSCI SDG score. On the original Robeco SDG score rating of -3 to 3, the effect of being included in a sustainable thematic fund is 1.1 and having a DNSH violation is -2.5. This respectively compares to effects of 1.3 and -3.1 on the MSCI SDG score, which ranges from -10 to 10 (see annexes 1 and 2 for regression results with the original rating scales). The coefficients for companies on investors' exclusion lists and for companies' percentage of EU Taxonomy-aligned revenues are comparable across both scores.

ESG ratings. ESG ratings have less alignment with stakeholders' expressions of corporate sustainability performance. Yet there are notable differences in how ratings of individual providers align with the hypotheses. Table 7 presents the results of the analysis.

--- insert table 7 ---

The ESG ratings of MSCI and Sustainalytics capture negative sustainability performance. Companies that are excluded by investors and those that have DNSH violations in relation to the EU Taxonomy receive poorer ratings from these two providers. These effects are statistically significant, also when including controls into the model. Economically, MSCI's ESG rating is more strongly negatively associated with DNSH violations while Sustainalytics' ESG rating has a stronger negative relation with companies on exclusion lists. The economic effect is weaker compared to the SDG scores. Additionally, these ratings are less able to capture positive sustainability performance. Companies that investors include in sustainable thematic funds receive slightly higher ratings by MSCI, while this effect is less prevalent in the rating of Sustainalytics. Moreover, neither rating is positively associated with a company's share of EU Taxonomy-aligned revenues.

Second, the ESG ratings of Refinitiv and S&P do not align with most proxies of how stakeholders view sustainability performance. Both providers give better (instead of worse) ESG ratings to companies that investors (exclusion) and regulators (DNSH violation) believe to have negative impact, yet these results become statistically insignificant when including controls. The coefficients for the thematic test are positive and statistically significant across both versions of the model, yet these findings have moderate economic significance. For instance, on the original range from 1 – 100, I find a coefficient of 0.049 for the Refinitiv ESG rating. This is higher for the S&P ESG rating, at 6.833 on the same scale. The share of a company's taxonomy-aligned revenues is not associated with its ESG rating by these providers.

4.3 Robustness

These results are robust to alternative specifications of the model. First, I created a binary (independent) variable that indicates if a company is on any of the asset owners' exclusion lists, rather than being excluded by at least four organizations. This change led to lower but still substantial economic significance for the SDG scores, with no substantial difference for the

ESG ratings relative to the main results. Second, in separate regressions, different combinations of independent variables were used, including, alternative proxies of company size (revenues; employees) and location (country and market classification as emerging or developed) were used. In these calculations the statistical and economic significance of the results did not change substantially. Moreover, the analysis was replicated using SDG scores and ESG ratings that were not z-standardized but followed the original rating, as to respect the ordinal nature of the SDG scores and to facilitate the interpretation of the results. The results are similar and the analysis is shown in annexes 2 and 3.

5. DISCUSSION

This section discusses implications of the findings for research and practice, highlights limitations, and presents future research avenues.

5.1 Sustainable investing research and practice

There are substantial differences between SDG scores and ESG ratings. The two SDG scores and four ESG ratings in this study are uncorrelated. Companies that rank in one quartile of an SDG score have a similar likelihood of ranking in the first, second, third, or fourth quartile of an ESG rating. Moreover, SDG scores reflect tilts across the sectors in which companies are active, but show greater similarity across the geographic regions in which companies operate. In contrast, while ESG ratings tend to reveal similar sectoral distributions, they fluctuate more across regions. These differences invite an investigation of whether these scores capture how sustainable companies are as perceived by relevant stakeholders.

This paper's findings reveal that SDG scores align with how investors and regulators judge corporate sustainability performance. First, companies that asset owners exclude due to their adverse impacts, and those that investors hold in sustainable thematic portfolios, overwhelmingly and respectively receive negative and positive SDG scores (in line with

Hypotheses 1a and 1b). Second, SDG scores are negatively associated with violations of the EU Taxonomy's DNSH principle, and positively related to the generation of revenues that the EU Taxonomy views as helping tackle climate change (aligned with Hypotheses 2a and 2b). These results apply to the SDG scores of Robeco and MSCI, whereby the economic significance of the Robeco SDG score is highest, particularly for those companies that stakeholders view as delivering positive sustainability solutions. It is noteworthy that although the SDG scores of Robeco and MSCI are only slightly correlated, they have alignment with stakeholders' expressions of corporate sustainability. This can be explained by the variation in Robeco and MSCI SDG scores for the sample of companies that stakeholders have no strong sustainability opinion about. For these companies, SDG scores can diverge substantially. This contrasts companies that stakeholders express to have negative (Hypotheses 1a and 2a) and positive impacts (Hypotheses 1b and 2b). For these samples the SDG scores of both providers are more strongly correlated.

In contrast, ESG ratings lack agreement with stakeholders' evaluations of corporate sustainability performance, although there is divergence among individual ratings. Because companies excluded by investors and those flagged for having DNSH violations receive lower ratings, the ESG assessments of MSCI and Sustainalytics are aligned with Hypotheses 1a and 2a. It is noteworthy that the economic significance is lower relative to SDG scores. The ESG ratings of MSCI and Sustainalytics are not aligned with Hypotheses 1b and 2b since being included in sustainable thematic funds and generating revenues aligned with the EU Taxonomy is not substantially related to company ESG ratings. The ratings of Refinitiv and S&P fall short of Hypotheses 1a, 2a, and 2b. There is statistical alignment with Hypothesis 1b though the economic effect is insubstantial.

Various companies can illustrate these results. For example, British American Tobacco (BAT) is excluded by various asset owners due to it producing tobacco products. In line with

these investors' sustainability preferences, the Robeco and MSCI SDG scores for BAT are highly negative, with particularly poor scores on SDG 3 – Good Health and Well Being. However, the ESG ratings that it receives are average (Sustainalytics and MSCI) or good (Refinitiv and S&P). For instance, Refinitiv gives BAT particularly high ratings for governance, but also awards it for its environmental and social performance. As another example, Aguas Andinas SA is a Chile-based company that distributes drinking water and collects and treats sewage water. It is included in multiple sustainable thematic funds. Supporting the view of these investors' sustainability preferences, it receives good SDG scores. Yet its ESG ratings are low to moderate in the assessments of all four providers.

These findings lead to the conclusion that SDG scores enjoy high and ESG ratings low construct validity as a measure of corporate sustainability performance, viewed from an impact materiality lens. This can be explained by the different aims of these ratings. SDG scores explicitly aim to measure companies' positive and negative contributions to sustainable development. In turn, although ESG ratings of different providers may vary in focus, these primarily assess if companies are exposed to risks that stem from ESG topics and how well the company is managing such risks (Giese et al., 2019; Popescu et al., 2021). Despite the fact that ESG ratings are frequently understood as indicating sustainability performance, which causes ambiguity (Scheitza et al., 2022), these results underscore that they are not to be understood as measuring companies' contributions to sustainable development. This paper's findings contribute greater clarity on the differences between ESG ratings and SDG scores, and caution against using concepts like ESG, sustainability, and impact interchangeably.

While these diverging findings stem from the varying ambitions of SDG scores and ESG ratings, they are caused by their different methodologies. The methods of the Robeco and MSCI SDG scores address similar dimensions of sustainability performance as the stakeholders' assessments (thus leading to some mechanical correlation). For example, both

SDG scores look at revenues from activities with negative impacts, such as tobacco or thermal coal, which feature on the exclusion lists of many asset owners. They also cover products that have positive effects, like water or energy solutions, which relate to sustainable thematic funds and the EU Taxonomy. The strong relation between how methodologies for SDG scores assess company sustainability and how investors and regulators evaluate companies' impacts suggests that the SDGs can serve as a potential framework for a global understanding of sustainability at the societal (macro) as well as the organizational (micro) levels of analysis. ESG ratings are built using methodologies that assess the financial materiality of sustainability topics and how companies are managing them. This leads them to have methodologies that are more distinct from the investors' and regulators' corporate sustainability expressions.

These findings are relevant for investors. Sustainable investing is increasingly being regulated. The European Union defined a sustainable investment in its landmark Sustainable Finance Disclosure Regulation (SFDR) as an investment that contributes to social or environmental objectives while not significantly harming any of those objectives and following good governance (European Union, 2019). My results show that sustainable investing strategies that are solely based on ESG ratings fall short of this definition. Despite ESG ratings remaining dominant in the sustainable investing industry (Berg et al., 2022; Fiaschi et al., 2020; Linnenluecke, 2022; Popescu et al., 2021; Scheitza et al., 2022), such strategies are likely to invest in companies that cause harm while missing investments in companies providing solutions for sustainability challenges. I show that SDG scores can overcome this challenge, enabling investors to allocate financing to companies with positive social and environmental contributions while avoiding negative impacts. Jointly, ESG ratings and SDG scores can be part of (sustainable) investing strategies that follow the European Commission's (2021) concept of 'double materiality', which seeks to identify how sustainability considerations affect

financial performance, and how investments impact the real world. An ESG rating may inform the former dimension, while an SDG score can shed light on the latter.

These results also have implications for researchers. Scholars frequently use ESG ratings to measure sustainability performance. Some use ESG as an independent variable, in order to explain how sustainability performance influences dependent variables, such as financial performance (e.g., Friede et al., 2015), access to capital (e.g., Cheng et al., 2014; El Ghoul et al., 2011), or stakeholder management (e.g., Fu et al., 2021). Others use ESG as a dependent variable and study how sustainability performance is affected by independent variables, like a company's home country (e.g., Ioannou & Serafeim, 2012; Linnenluecke, 2022), its degree of internationalization (e.g., Attig et al., 2016), or its board composition (e.g., Arayssi et al., 2020; Manita et al., 2018). Such studies yield important findings. At the same time, because of the large differences between and among ESG ratings and SDG scores, I advise researchers to carefully consider the construct validity of the sustainability metrics that they use.

Finally, this study informs sustainability research. Sustainable investing is widely regarded as a tool for promoting social and environmental sustainability (Betti et al., 2018; Crona et al., 2021; Krosinsky, 2013; Stephenson et al., 2021; Zhan & Santos-Paulino, 2021), for raising the financing needed to attain the SDGs (UN, 2015a) and for making financial flows consistent with the Paris Agreement (UN, 2015b). But there is a paradox. While sustainable investing is reaching significant scale, and although ESG ratings have been demonstrated to influence financial flows in practice (Hartzmark & Sussman, 2019), a real shift towards more sustainable business practices is not taking shape (Busch et al., 2016; Dyllick & Muff, 2016). This paper sheds light on this paradox. Since ESG ratings do not gauge a company's impacts on human and planetary wellbeing, as this paper demonstrated, then it cannot be expected that investment strategies incorporating ESG support sustainable development. Recent research shows that even investors that commit to different sustainable investing initiatives, like the

Principles for Responsible Investment (PRI) and the Institutional Investor Coalition on Climate Change (IICCC), do not allocate more financing to sustainable, and less to unsustainable, companies (van Zanten & Rein, 2023), suggesting that there is a need for better metrics on sustainable investing, and more sustainable investment practices more generally.

5.2 Limitations and future research

This study faces limitations yet invites future research along various lines. First, in assessing if ESG ratings and SDG scores align with investors' revealed sustainability preferences I had to rely on information from Western investors. Based on the number of investors in scope and the volume of assets managed, I believe to have a representative perspective of Western investors' sustainability preferences. However, there might be a cultural bias since investors from other regions may employ different exclusion lists and might deploy other sustainable thematic funds. New studies can explore how SDG scores and ESG ratings align with investors' and regulators' sustainability preferences in other geographic regions.

Second, in this paper I compared four ESG ratings and two SDG scores using the aggregated assessment rather than investigating these ratings' sub-components. In addition, whereas investors' views on sustainability used in this paper are cross-cutting by focusing on both environmental and social aspects, the regulator's perspective addressed environmental sustainability only. Future research is needed to assess how additional dimensions of corporate sustainability, such as human rights and equality, is captured by disaggregated SDG scores and ESG ratings.

Third, I focused on a company's current level of sustainability performance. All six SDG and ESG ratings primarily assess a company's contemporary level of sustainability, while the stakeholder views on corporate sustainability performance similarly address companies' current rather than future levels of sustainability performance. Yet advancing sustainable development at the level of societies requires companies to shift towards, and thus become,

more sustainable in the future. Future research that unearths whether or not companies are transitioning towards more sustainable business models, and how this might be measured in ratings that investors can use, would be highly beneficial for researchers and practitioners. Such efforts can build on emerging studies in this area (e.g., Busch et al., 2022; Schaltegger et al., 2022).

Lastly, research on how investors impact the real world is important and draws increased interest (Kölbel et al., 2020; Marti et al., 2023). Investors can have an impact on societies and the environment through capital allocation, through active ownership, and through field building (Marti et al., 2023). Research on the impacts of capital allocation (e.g., Berk & van Binsbergen, 2021; Blitz et al., 2021) and active ownership (Barko et al., 2021; Bauer et al., 2022; de Groot et al., 2021; Dimson & Karakaş, 2015; Dyck et al., 2019) is emerging. Research on the role of investors in field building is in its infancy (Marti et al., 2023). For all three types of strategies, future research can help illuminate how measures of corporate sustainability performance can be instrumental to making an impact in the real world.

6. CONCLUSION

ESG ratings have been criticized for misrepresenting companies' societal and environmental impacts, leading to concerns about greenwashing. The inconsistency among different ESG rating providers, whose ratings are often uncorrelated, adds to the confusion. In response, new sustainability metrics, such as SDG scores that assess corporate alignment with the Sustainable Development Goals (SDGs), have emerged.

This paper examined the relationship between ESG ratings and SDG scores, comparing data from four ESG providers and two SDG providers. The analysis found no correlation between these ratings, with SDG scores varying by sector but being similar across geographic

regions, while ESG ratings vary by geography but remain consistent across sectors. This indicates that a company's ESG rating does not reflect its SDG alignment.

Further empirical testing showed that SDG scores align with how investors and regulators assess corporate sustainability performance. Companies excluded by investors for negative impacts tend to have low SDG scores, while those included in sustainable thematic funds for their positive impacts generally score high. Similarly, companies that breach the EU Taxonomy's Do-No-Significant-Harm principle receive low SDG scores, while those generating revenues that this regulation confirms as supporting climate action score higher. In contrast, ESG ratings, which generally gauge if companies face sustainability risk rather than measuring their sustainability impacts, do not align well with how investors and regulators judge corporate sustainability. Hence, the SDG score has high, and ESG ratings low, construct validity as a sustainability rating. These divergent results indicate that there is discriminant validity between the SDG score and ESG ratings, and that they might be used complementarily.

Overall, by exploring if ESG ratings and SDG scores capture companies' contributions to sustainable development as perceived by relevant stakeholders, this paper contributed greater clarity around interpretating and valuing the metrics that are used in sustainable investing. I posit that if sustainable investors are to support creating a better world, they need ratings that measure companies' positive and negative impacts on the wellbeing of people and planet.

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Table 1. Distribution of the sample across individual SDG scores and ESG ratings, and the intersection sample.

	Count of companies across sectors and regions						
	Intersection sample	Robeco SDG	MSCI SDG	MSCI ESG	Sustainalytics ESG	Refinitiv ESG	S&P ESG
Total	6,607	9,218	7,787	7,799	8,996	7,603	9,219
Industry							
Industrials	17%	17%	17%	17%	17%	17%	17%
Financials	15%	14%	14%	14%	14%	16%	14%
Consumer discretionary	12%	12%	12%	12%	13%	12%	12%
Information technology	11%	11%	12%	12%	11%	10%	11%
Healthcare	10%	9%	10%	10%	9%	10%	9%
Materials	9%	9%	9%	9%	9%	10%	9%
Real estate	7%	7%	7%	7%	7%	7%	7%
Consumer staples	7%	6%	7%	7%	6%	6%	6%
Communication	5%	5%	5%	5%	5%	5%	5%
Energy	4%	4%	4%	4%	4%	4%	4%
Utilities	4%	3%	4%	4%	3%	4%	3%
Region							
North America	37%	31%	33%	33%	31%	36%	31%
Asia	36%	46%	42%	42%	46%	40%	46%
Europe	19%	16%	18%	18%	16%	18%	16%
Oceania	4%	3%	3%	3%	3%	3%	3%
South America	3%	3%	3%	3%	3%	3%	3%
Africa	1%	1%	1%	1%	1%	1%	1%

This table shows, for the intersection sample and each of the SDG scores and ESG ratings, the proportion of companies in each industry and region. Note that the sum of percentages across sectors may not equal the total number of companies covered. The reason is missing sector codes for a company for which an SDG score or ESG rating is available. All covered companies have a region.

Table 2. Distribution of SDG scores and ESG ratings for the original, intersection, and z-normalized samples.

Variable	Panel A: Robeco SDG						
	N	Average	Minimum	25%	Median	75%	Maximum
Original	9,218	0.5	-3.0	0.0	1.0	2.0	3.0
Intersection	6,607	0.5	-3.0	0.0	1.0	2.0	3.0
Z-normalized	6,607	0.0	-2.4	-0.3	0.3	1.0	1.7
Control (Z)	2,101	-0.1	-2.4	-1.0	0.3	1.0	1.7
Variable	Panel B: MSCI SDG						
	N	Average	Minimum	25%	Median	75%	Maximum
Original	7,789	0.0	-10.0	-0.5	-0.5	2.0	7.5
Intersection	6,607	0.0	-10.0	-0.5	-0.5	2.5	7.5
Z-normalized	6,607	0.0	-2.9	-0.2	-0.2	0.7	2.2
Control (Z)	2,101	-0.1	-2.9	-0.3	-0.2	0.7	2.2
Variable	Panel C: MSCI ESG						
	N	Average	Minimum	25%	Median	75%	Maximum
Original	7,799	5.4	0.0	3.7	5.6	7.2	10.0
Intersection	6,607	5.6	0.0	4.0	5.9	7.4	10.0
Z-normalized	6,607	0.1	-2.3	-0.6	0.2	0.8	1.9
Control (Z)	2,101	0.4	-2.3	-0.2	0.5	1.0	1.9
Variable	Panel D: Sustainalytics ESG						
	N	Average	Minimum	25%	Median	75%	Maximum
Original	8,996	75.7	30.7	70.3	76.5	82.2	95.8
Intersection	6,607	76.4	30.7	71.1	77.3	82.9	95.8
Z-normalized	6,607	0.1	-4.9	-0.5	0.2	0.8	2.2
Control (Z)	2,101	0.2	-4.3	-0.3	0.4	1.0	2.2
Variable	Panel E: Refinitiv ESG						
	N	Average	Minimum	25%	Median	75%	Maximum
Original	7,603	51.2	0.7	36.7	52.7	66.4	94.8
Intersection	6,607	53.0	0.8	39.4	54.9	67.6	94.8
Z-normalized	6,607	0.1	-2.6	-0.6	0.2	0.8	2.2
Control (Z)	2,101	0.6	-2.0	0.2	0.7	1.2	2.2
Variable	Panel F: S&P ESG						
	N	Average	Minimum	25%	Median	75%	Maximum
Original	9,219	27.5	0.0	14.7	23.0	35.3	92.5
Intersection	6,607	30.7	1.9	17.2	25.9	39.8	92.5
Z-normalized	6,607	0.2	-1.4	-0.6	-0.1	0.7	3.6
Control (Z)	2,101	0.7	-1.4	-0.1	0.4	1.4	3.6

The table shows descriptive statistics for the SDG scores and ESG ratings. The original sample refers to all companies covered by an SDG score or ESG rating. The intersection sample comprises the companies that are covered by all SDG scores and ESG ratings. The z-normalized sample presents descriptive statistics for the normalized values of the intersection sample. The Control (Z) sample is the sample of companies that has control statistics available and is used in models 5-7 of the regression analysis, using z-normalized values. 25% and 75% respectively refer to the 25^{th} and 75^{th} percentiles of the sample.

Table 3. Overview of exclusion lists.

	Asset Owner	Country	Assets (bn $)	Topics on exclusion list	Number of companies on exclusion list
1	Norway Government Pension Fund	Norway	1.344	Coal; Nuclear; Tobacco; Human rights; Environment; Controversial weapons	181
2	ABP	Netherlands	607	Controversial weapons; Nuclear; Tobacco	298
3	PGGM	Netherlands	330	Tobacco; Coal; Oil & Gas; Russia/Belarus involvement; Controversial weapons; Tar sands; Artic oil drilling	519
4	PFZW	Netherlands	295	Tobacco; Coal; Controversial weapons; Tar sands	207
5	MN Services N.V.	Netherlands	197	Controversial weapons; Dialogue unsuccessful	36
6	ATP	Denmark	177	Controversial weapons; Human rights; Safety conditions, Violations of NPT; Biodiversity; Violations of ILO; Corruption	105
7	Future Fund	Australia	132	Tobacco; Controversial weapons	58
8	Bouwnijverheid	Netherlands	125	Controversial weapons; Tobacco; UNGC	150
9	Metaal/tech. Bedrijven	Netherlands	119	Controversial weapons; Dialogue unsuccessful	36
10	Danica Pension	Denmark	111	Controversial weapons; Tobacco; Norms; Coal; Tar sands; Peat-fired power generation	1.074
11	PFA Pension	Denmark	104	Controversial weapons; Environment; Human rights; Labor rights	80
12	KLP	Norway	103	Gambling; Coal; Weapons; Tobacco; Rights in war and conflict; Human rights; Oil sands; Environment; Corruption	521
13	AP Fonden 7	Sweden	77	Nuclear; Human rights; Cannabis; Environment; Labor rights; Controversial weapons	86
14	PME	Netherlands	75	Tobacco; Fur; Oil & Gas; Coal; Controversial weapons; Russia/Belarus involvement; Adult entertainment; Tar sands; Dialogue unsuccessful	622
15	AP Fonden 3	Sweden	52	Controversial weapons; Cannabis; Dialogue unsuccessful	21
16	Vervoer Pension	Netherlands	50	Tobacco; Coal; Controversial weapons; Human rights; Tar sands; Environment	225
17	Sampension	Denmark	50	Coal; Controversial weapons; Tar sands; Human rights; Environment; International Sanctions; Labor rights	264
18	AP Fonden 1	Sweden	47	Controversial weapons; Oil; Oil sands; Tobacco; Dialogue unsuccessful	29

19	AP Fonden 2	Sweden	46	Cannabis; Metals and mining; Aerospace and defense; Chemicals; Industrial; Telecom; Food and staples retailing	17
20	ABN AMRO Pensioenfonds	Netherlands	44	Controversial weapons; Corruption; Environment; Human rights; Labor rights; Tobacco	81
21	Rabobank Pensioenfonds	Netherlands	44	Tobacco; Controversial weapons; Fossil fuels; Norms; Exclusions of state enterprises concerning country policy	261
22	ING Pensioenfonds	Netherlands	39	Tobacco; Palm oil; Fossil fuels; Controversial weapons	644
23	New Zealand Superannuation	New Zealand	28	Cannabis; Tobacco; Controversial weapons; Poor ESG Practice	340
24	PKA	Denmark	27	Coal; Oil & gas; Controversial weapons; Human rights; International sanctions; Tobacco; Environment; Oil sands; Transport; Deforestation; Corporate	308
25	Fonds de Compensation	Luxembourg	26	Controversial weapons; Human rights; Business ethics; Environment	137
26	Credit Suisse	Switzerland	20	Controversial weapons; Conduct based	21
27	SPMS	Netherlands	16	Tobacco; Nuclear; Controversial weapons	189

This table shows the investors whose exclusion lists were used as input to this paper's empirical analysis. It lists the investors, their country, their size measured by assets, the topics covered by their exclusion lists, and the number of excluded companies.

Table 4. Overview of sustainable thematic funds.

	Fund name	Inception	Number of holdings	Assets under management (million US$)
Energy	First Trust Global Wind Energy ETF	2008	48	351
	First Trust Nasdaq Cln Ed	2017	70	27
	First Trust NASDAQ® Clean Edge® Green Energy Index Fund (QCLN)	2007	60	3,015
	Invesco Global Clean Energy ETF	2007	141	358
	Invesco WilderHill Clean Energy ETF	2005	72	1,725
	iShares Global Clean Energy	2007	76	5,818
	RobecoSAM Smart Energy Equities	2006	62	4,198
Water	Allianz Global Water	2018	41	1,024
	Calvert Global Water	2008	118	563
	Ecofin Global Water ESG IndexCo	2017	42	67
	First Trust Water ETF	2007	37	1,532
	Invesco S&P Global Water Index ETF	2007	58	1,248
	Invesco Water Resources ETF	2005	38	2,062
	RobecoSAM Sustainable Water Equities	2001	74	3,775
Health	Fidelity Global Health Care Fund	2000	59	1,954
	RobecoSAM Sustainable Healthy Living Equities	2007	46	917
	SPDR MSCI Europe Health Care	2014	40	842

This table lists the sustainable thematic investment solutions used in this study, broken down per theme. It shows the inception of the fund, the number of holding companies, and the size of each fund measured by assets.

Table 5. Treatment-control comparison for SDG scores and ESG ratings.

Variable	Panel A: Robeco SDG					
	Average		Median		T-statistic	Cohen's *d*
	Treated	*Control*	*Treated*	*Control*		
Exclusion	-1.8	0.0	-2.4	0.3	-22.9***	-1.8
Thematic	0.7	-0.1	1.0	0.3	16.5***	0.8
DNSH violation	-1.8	0.0	-2.0	0.3	-13.5***	-2.0
Aligned revenues	0.7	-0.1	1.0	0.3	14.5***	0.8
Variable	Panel B: MSCI SDG					
	Average		Median		T-statistic	Cohen's *d*
	Treated	*Control*	*Treated*	*Control*		
Exclusion	-1.6	0.0	-1.3	0.2	-17.0***	-1.4
Thematic	0.3	0.0	-0.2	-0.2	5.9***	0.3
DNSH violation	-1.3	0.1	-1.0	0.2	-5.5***	-1.1
Aligned revenues	0.5	0.0	0.5	-0.2	7.6***	0.5
Variable	Panel C: MSCI ESG					
	Average		Median		T-statistic	Cohen's *d*
	Treated	*Control*	*Treated*	*Control*		
Exclusion	-0.3	0.1	-0.1	0.2	-4.9***	-0.4
Thematic	0.8	0.1	0.8	0.1	18.3***	0.8
DNSH violation	-0.8	0.1	-0.7	0.2	-4.8***	-0.9
Aligned revenues	0.1	0.1	0.2	0.2	0.6	0.0
Variable	Panel D: Sustainalytics ESG					
	Average		Median		T-statistic	Cohen's *d*
	Treated	*Control*	*Treated*	*Control*		
Exclusion	-1.1	0.1	-1.0	0.2	-13.2***	-1.1
Thematic	0.4	0.1	0.5	0.2	8.4***	0.4
DNSH violation	-1.2	0.1	-0.7	0.2	-4.1***	-0.9
Aligned revenues	0.3	0.1	0.5	0.2	3.2**	0.22
Variable	Panel E: Refinitiv ESG					
	Average		Median		T-statistic	Cohen's *d*
	Treated	*Control*	*Treated*	*Control*		
Exclusion	0.4	0.1	0.4	0.1	4.7***	0.3
Thematic	0.7	0.1	0.8	0.1	14.1***	0.7
DNSH violation	0.9	0.1	1.0	0.2	6.1***	0.9
Aligned revenues	0.1	0.2	0.3	0.3	0.7	0.1
Variable	Panel F: S&P ESG					
	Average		Median		T-statistic	Cohen's *d*
	Treated	*Control*	*Treated*	*Control*		
Exclusion	0.5	0.2	0.3	-0.1	3.7***	0.3
Thematic	0.8	0.1	0.5	-0.1	11.4***	0.6
DNSH violation	1.1	0.2	1.1	-0.1	4.4***	0.8
Aligned revenues	0.3	0.2	0.1	-0.1	1.9*	0.1

This table presents the results of a treatment-control analysis that evaluates if companies in the treatment groups (i.e., being excluded by investors or included in sustainable thematic funds, and being flagged for DNSH violations under the EU Taxonomy and having over 66% EU Taxonomy aligned revenues) have different SDG scores and ESG ratings than the companies in the control group (i.e., not being in each respective treatment group). The table shows the average and median SDG scores and ESG ratings for the treatment and control groups and tests if these differences are statistically (T-statistic) and economically (Cohen's *d*) significant. ***, ** and * denote significance at the 0.01, 0.05 and 0.1 level, respectively.

Table 6. Regression results for SDG scores (z-standardized).

Variable	Panel A: Robeco SDG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exclusion	-1.777***				-1.724***			
	(-24.356)				(-17.099)			
Thematic		0.709***				0.788***		
		(13.676)				(9.861)		
DNSH violation			-1.799***				-1.692***	
			(-9.997)				(-7.400)	
Aligned revenues				0.010***				0.009***
				(13.624)				(7.108)
Controls	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.082	0.028	0.015	0.061	0.189	0.117	0.100	0.109
Observations	6,607	6,607	6,607	2,846	2,101	2,101	2,101	1,183
Variable	Panel B: MSCI SDG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exclusion	-1.659***				-1.825***			
	(-22.973)				(-17.916)			
Thematic		0.292***				0.396***		
		(5.644)				(4.796)		
DNSH violation			-1.251***				-0.917***	
			(-7.020)				(-3.913)	
Aligned revenues				0.009***				0.007***
				(10.990)				(5.212)
Controls	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.074	0.005	0.007	0.041	0.243	0.136	0.133	0.146
Observations	6,607	6,607	6,607	2,846	2,101	2,101	2,101	1,183

This table shows regression results where the dependent variable is: the Robeco SDG score in Panel A; and the MSCI SDG score in Panel B. Both scores have been z-normalized to support comparability. The independent variables are: *Exclusion*, a dummy indicating if a company is on the exclusion list of asset owners due to its negative impacts; *Thematic*, a dummy indicating if a company is included in sustainable thematic portfolios; *DNSH violation*, a dummy indicating if a company is violating the EU Taxonomy's do-no-significant-harm criteria; and *Aligned revenues*, the percentage of company revenues that is aligned with the EU taxonomy. Each column contains the results for one regression. Columns (1) to (4) do not include control variables. Columns (5) to (8) include *Sector*, *Region*, *Size*, and *Company Fundamentals* as controls. ***, ** and * denote significance at the 0.01, 0.05 and 0.1 level, respectively.

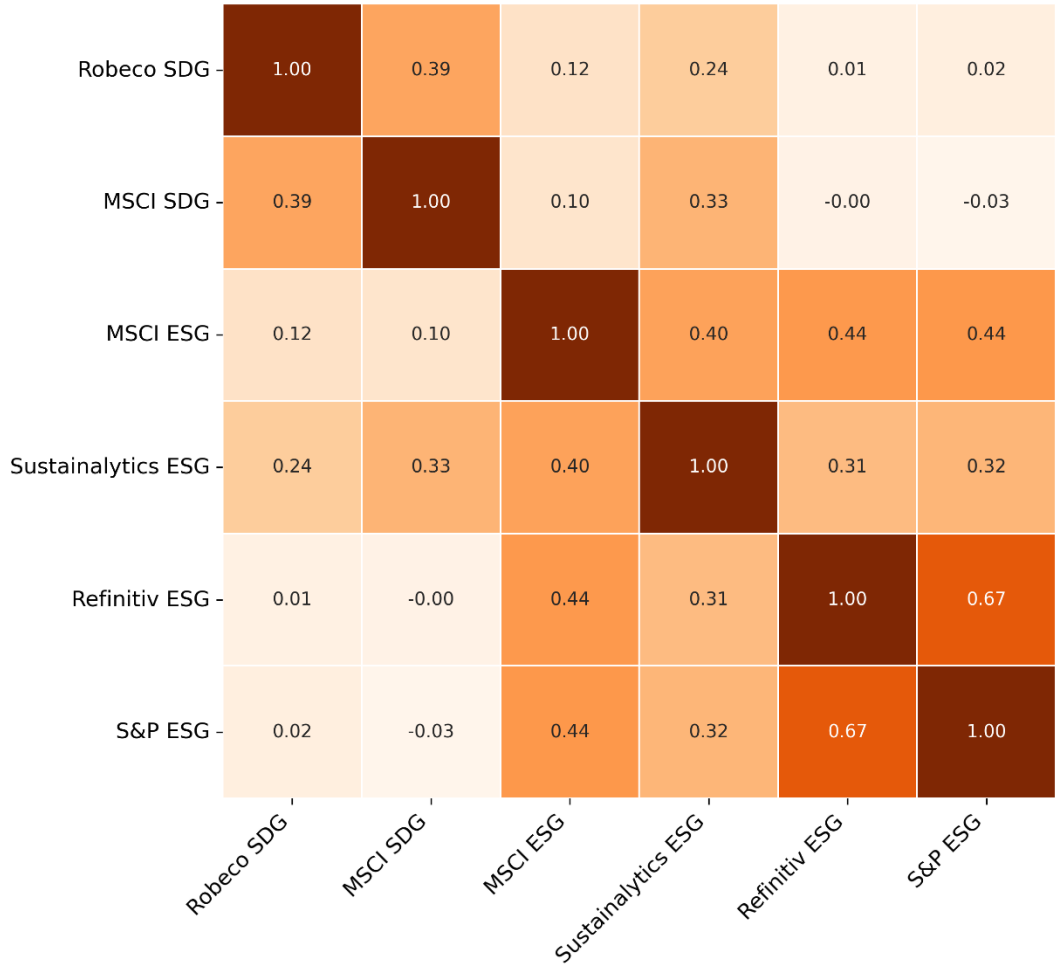
Table 7. Regression results for ESG ratings (z-standardized).

Variable	Panel A: MSCI ESG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exclusion	-0.362***				-0.710***			
	(-4.957)				(-7.536)			
Thematic		0.711***				0.461***		
		(14.287)				(6.414)		
DNSH violation			-0.867***				-1.377***	
			(-4.982)				(-6.770)	
Aligned revenues				0.001				0.001
				(0.985)				(0.656)
Controls	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.004	0.030	0.004	0.000	0.078	0.071	0.073	0.064
Observations	6,607	6,607	6,607	2,846	2,101	2,101	2,101	1,183
Variable	Panel B: Sustainalytics ESG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exclusion	-1.187***				-1.351***			
	(-16.405)				(-15.168)			
Thematic		0.339***				0.195*		
		(6.667)				(2.744)		
DNSH violation			-1.237***				-0.887***	
			(-7.060)				(-4.415)	
Aligned revenues				0.003***				0.001
				(3.726)				(0.486)
Controls	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.039	0.007	0.007	0.005	0.258	0.179	0.184	0.216
Observations	6,607	6,607	6,607	2,846	2,101	2,101	2,101	1,183
Variable	Panel C: Refinitiv ESG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exclusion	0.319***				-0.110			
	(4.393)				(-1.598)			
Thematic		0.621***				0.251***		
		(12.453)				(4.846)		
DNSH violation			0.825***				0.159	
			(4.753)				(1.078)	
Aligned revenues				-0.000				0.001
				(-0.433)				(0.997)
Controls	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.003	0.023	0.003	0.000	0.115	0.124	0.114	0.122
Observations	6,607	6,607	6,607	2,846	2,101	2,101	2,101	1,183

Variable	Panel D: S&P ESG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exclusion	0.295***				-0.085			
	(3.828)				(-0.839)			
Thematic		0.642***				0.384**		
		(12.171)				(5.042)		
DNSH violation			0.895***				0.326	
			(4.881)				(1.501)	
Aligned revenues				0.001				0.001
				(0.657)				(0.753)
Controls	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.002	0.022	0.004	0.000	0.109	0.119	0.110	0.108
Observations	6,607	6,607	6,607	2,846	2,101	2,101	2,101	1,183

This table shows regression results where the dependent variable is: the MSCI ESG rating in Panel A; the Sustainalytics ESG rating in Panel B; the Refinitiv ESG rating in Panel C; and the S&P ESG rating in Panel D. All ESG ratings have been z-normalized to support comparability. The independent variables are: *Exclusion*, a dummy indicating if a company is on the exclusion list of asset owners due to its negative impacts; *Thematic*, a dummy indicating if a company is included in sustainable thematic portfolios; *DNSH violation*, a dummy indicating if a company is violating the EU Taxonomy's do-no-significant-harm criteria; and *Aligned revenues*, the percentage of company revenues that is aligned with the EU taxonomy. Each column contains the results for one regression. Columns (1) to (4) do not include control variables. Columns (5) to (8) include *Sector*, *Region*, *Size*, and *Company Fundamentals* as controls. ***, ** and * denote significance at the 0.01, 0.05 and 0.1 level, respectively.

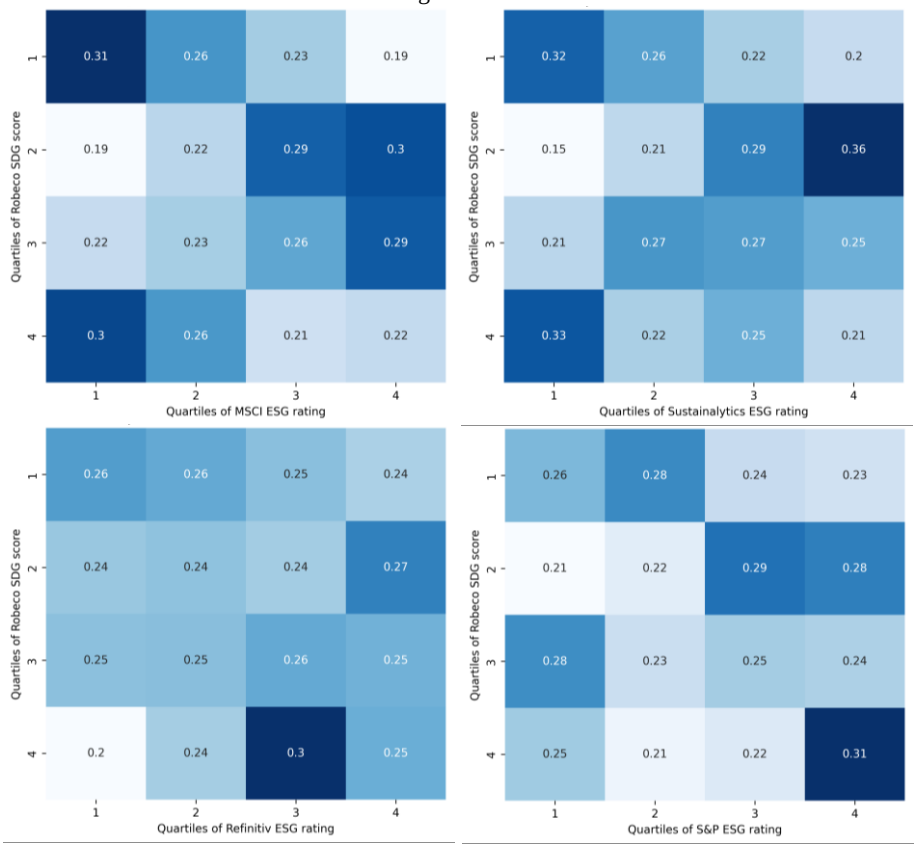
Figure 1. Correlation among SDG scores and ESG ratings



This figure visualizes the correlation between the SDG scores and ESG ratings used in this study. The values are Pearson correlation coefficients. Darker/lighter shades indicate higher/lower correlation between two sustainability ratings.

Figure 2. Comparing SDG scores to ESG ratings through quartile matching.

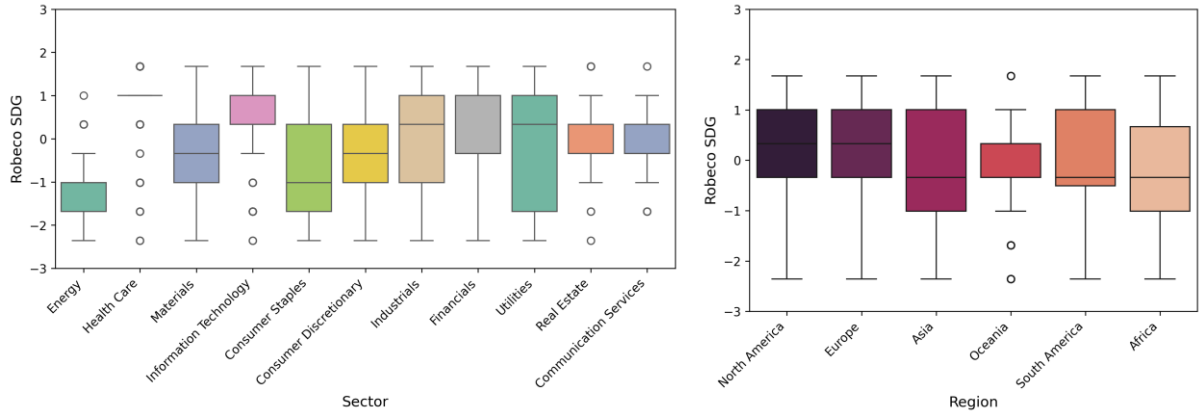
Panel A: Robeco SDG score and ESG ratings



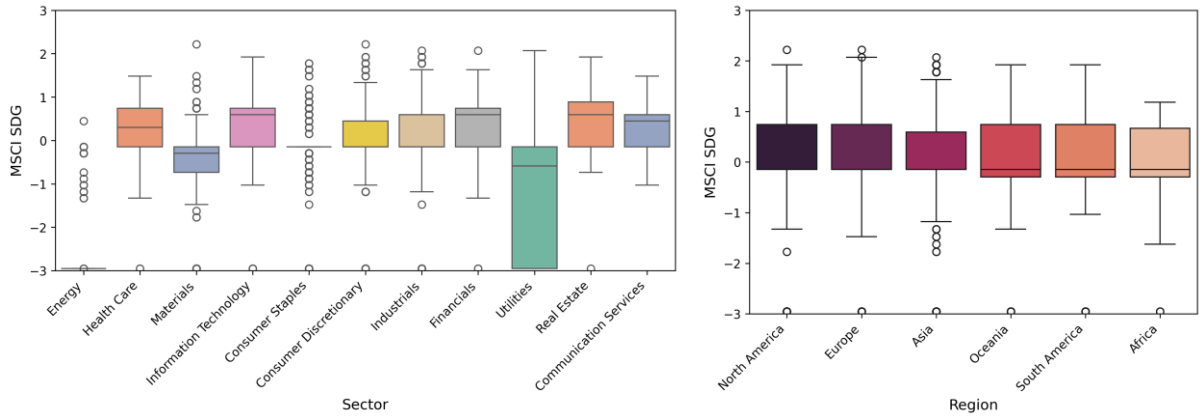
Panel B: MSCI SDG score and ESG ratings.

This figure visualizes the distributions of Robeco (Panel A) and MSCI (Panel B) SDG scores to four ESG ratings by examining how the data in each quartile of the SDG score corresponds to the quartiles of ESG ratings. Darker/lighter shades indicate that a higher/lower proportion of companies score within the matched quartiles of two ratings.

Figure 3. Distribution of SDG scores across sectors and regions.
Panel A: Robeco SDG score



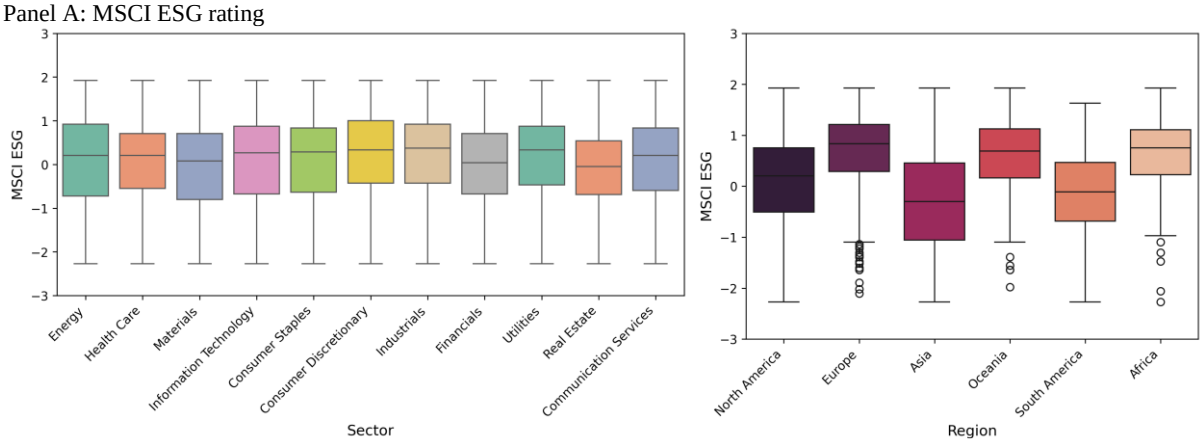
Panel B: MSCI SDG score



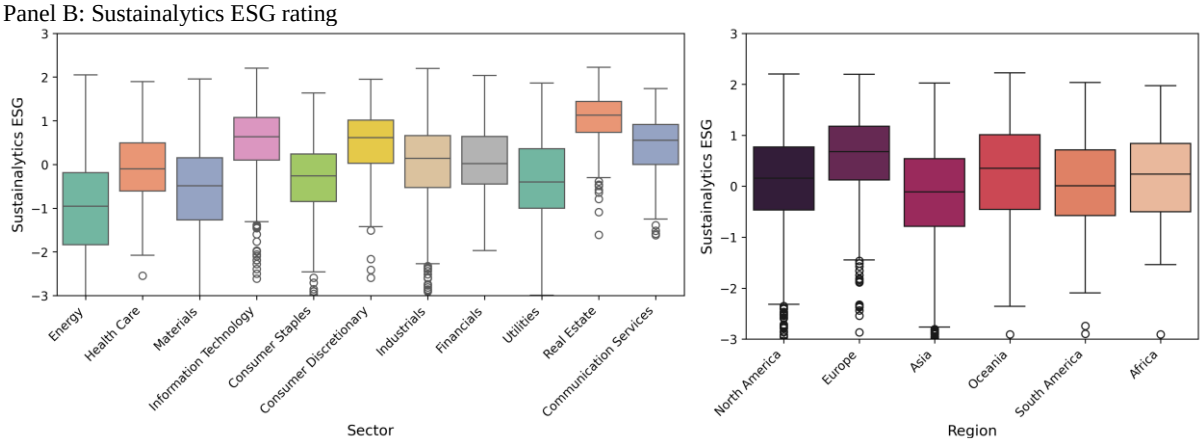
The boxplots visualize the distribution of Robeco (Panel A) and MSCI (Panel B) SDG scores across sectors and regions. Both scores have been z-normalized to support comparability. The boxes show the range where the middle 50% of scores lie, with the bottom and top showing the first and third quartiles. The horizontal line in the box shows the median. The whiskers at the top and bottom of the box cover the majority of the rest of the SDG scores, with outliers shown as individual dots outside of the whiskers.

Figure 4. Distribution of ESG ratings across sectors and regions.

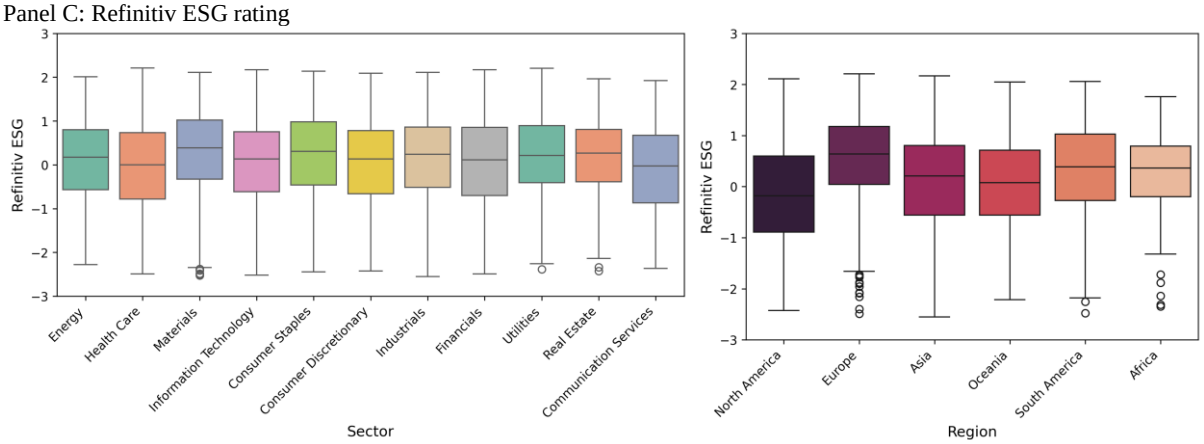
Panel A: MSCI ESG rating



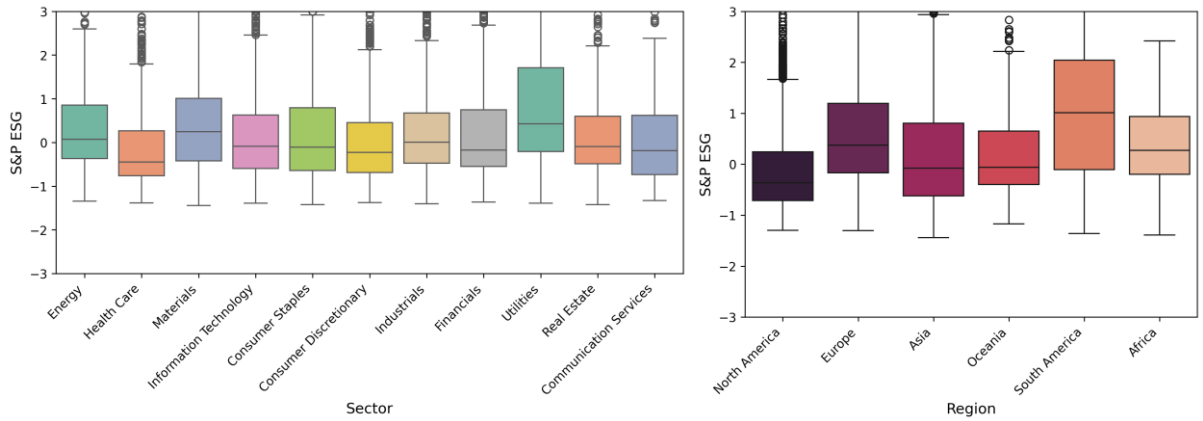
Panel B: Sustainalytics ESG rating



Panel C: Refinitiv ESG rating



Panel D: S&P ESG rating



The boxplots visualize the distribution of the ESG ratings of MSCI (Panel A), Sustainalytics (Panel B), Refinitiv (Panel C) and S&P (Panel D) across sectors and regions. All scores have been z-normalized to support comparability. The boxes show the range where the middle 50% of scores lie, with the bottom and top showing the first and third quartiles. The horizontal line in the box shows the median. The whiskers at the top and bottom of the box cover the majority of the rest of the SDG scores, with outliers shown as individual dots outside of the whiskers.

Annex 1. Descriptions of variables.

Variable	Description	Unit/range	Source
Corporate sustainability ratings			
Robeco SDG	Robeco SDG score	-3 to 3	Robeco
MSCI SDG	MSCI SDG score	-10 to 10	MSCI
MSCI ESG	MSCI ESG rating	1 to 10	MSCI
Sustainalytics ESG	Sustainalytics ESG rating	1 to 100	Sustainalytics
Refinitiv ESG	Refinitiv ESG rating	1 to 100	Refinitiv
S&P ESG	S&P ESG rating	1 to 100	S&P
Stakeholder perceptions of sustainability performance			
Exclusion	A binary variable that measures if a company is excluded by more than four asset owners	Y/N	Authors
Thematic	A binary variable that measures if a company is included in at least one sustainable thematic fund	Y/N	Authors
DNSH violation	A binary variable that flags if a company is violating the EU Taxonomy's do-no-significant-harm principle	Y/N	Sustainalytics
Taxonomy revenues	A variable that measures the percentage of company revenues from activities that help take climate action according to the EU Taxonomy	%	Sustainalytics
Control variables			
Sector	The Global Industry Classification Standard sub-industry classification system (8-digit)	None	MSCI
Region	A categorical variable that indicates the geographic region that a company is domiciled in, distinguishing between six regions.	1 to 10	Worldscope
Size	Market capitalization, the share price multiplied by the number of ordinary shares in issue;	1,000 Euro	Datastream; MV
Control variable			
EPS/P	Earnings per share; Computation: Earnings per share (Euro) \ stock price (Euro)	None	Datastream; EPS, P
ROIC	Return on Invested Capital	None	Worldscope; WC08376
OPM	Operating Profit Margin; rescaled through dividing by 10	None	Worldscope; WC08316
Leverage	Total Debt / Common Equity; rescaled through dividing by 100	None	Worldscope; WC08231

This table lists the variables used in this study, including their sources.

Annex 2. Regression results for SDG scores.

Variable	Panel A: Robeco SDG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exclusion	-2.643***				-2.566***			
	(-24.356)				(-17.099)			
Thematic		1.056***				1.173***		
		(13.676)				(9.861)		
DNSH violation			-2.678***				-2.519***	
			(-9.997)				(-7.400)	
Aligned revenues				0.015***				0.013***
				(13.624)				(7.108)
Controls	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.082	0.028	0.015	0.061	0.189	0.117	0.100	0.109
Observations	6,607	6,607	6,607	2,846	2,101	2,101	2,101	1,183
Variable	Panel B: MSCI SDG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exclusion	-5.614***				-6.174***			
	(-22.973)				(-17.916)			
Thematic		0.988***				1.340***		
		(5.644)				(4.796)		
DNSH violation			-4.232***				-3.105***	
			(-7.020)				(-3.913)	
Aligned revenues				0.030***				0.024***
				(10.990)				(5.212)
Controls	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.074	0.005	0.007	0.041	0.243	0.136	0.133	0.146
Observations	6,607	6,607	6,607	2,846	2,101	2,101	2,101	1,183

This table shows regression results where the dependent variable is: the Robeco SDG score, which ranges from -3 to +3 in Panel A; and the MSCI SDG score, which ranges from -10 to +10, in Panel B. The independent variables are: *Exclusion*, a dummy indicating if a company is on the exclusion list of asset owners due to its negative impacts; *Thematic*, a dummy indicating if a company is included in sustainable thematic portfolios; *DNSH violation*, a dummy indicating if a company is violating the EU Taxonomy's do-no-significant-harm criteria; and *Aligned revenues*, the percentage of company revenues that is aligned with the EU taxonomy. Each column contains the results for one regression. Columns (1) to (4) do not include control variables. Columns (5) to (8) include *Sector*, *Region*, *Size*, and *Company Fundamentals* as controls. ***, ** and * denote significance at the 0.01, 0.05 and 0.1 level, respectively.

Annex 3. Regression results for ESG ratings.

Variable	Panel A: MSCI ESG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exclusion	-0.863***				-1.693***			
	(-4.957)				(-7.536)			
Thematic		1.695***				1.098***		
		(14.287)				(4.565)		
DNSH violation			-2.065***				-3.281***	
			(-4.982)				(-6.770)	
Aligned revenues				0.002				0.002
				(0.985)				(0.656)
Controls	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.004	0.030	0.004	0.000	0.078	0.071	0.073	0.064
Observations	6,607	6,607	6,607	2,846	2,101	2,101	2,101	1,183
Variable	Panel B: Sustainalytics ESG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exclusion	-10.718***				-12.196***			
	(-16.405)				(-15.168)			
Thematic		3.061***				1.762*		
		(6.667)				(2.744)		
DNSH violation			-11.169***				-8.011***	
			(-7.060)				(-4.415)	
Aligned revenues				0.026***				0.005
				(3.726)				(0.486)
Controls	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.039	0.007	0.007	0.005	0.258	0.179	0.184	0.216
Observations	6,607	6,607	6,607	2,846	2,101	2,101	2,101	1,183
Variable	Panel C: Refinitiv ESG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exclusion	0.063***				-0.022			
	(4.393)				(-1.598)			
Thematic		0.122***				0.049***		
		(12.453)				(4.846)		
DNSH violation			0.163***				0.031	
			(4.753)				(1.078)	
Aligned revenues				-0.000				0.000
				(-0.433)				(0.997)
Controls	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.003	0.023	0.003	0.000	0.115	0.124	0.114	0.122
Observations	6,607	6,607	6,607	2,846	2,101	2,101	2,101	1,183

Variable	Panel D: S&P ESG							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exclusion	5.241***				-1.505			
	(3.828)				(-0.839)			
Thematic		11.403***				6.833***		
		(12.171)				(5.042)		
DNSH violation			15.911***				5.795	
			(4.881)				(1.501)	
Aligned revenues				0.009				0.016
				(0.657)				(0.733)
Controls	No	No	No	No	Yes	Yes	Yes	Yes
R^2	0.002	0.022	0.004	0.000	0.109	0.119	0.110	0.108
Observations	6,607	6,607	6,607	2,846	2,101	2,101	2,101	1,183

This table shows regression results where the dependent variable is: the MSCI ESG rating, which ranges from 1 to 10 in Panel A; the Sustainalytics ESG rating, which ranges from 1 to 100, in Panel B; the Refinitiv ESG rating, which ranges from 1 to 100, in Panel C; and the S&P ESG rating, which ranges from 1 to 100, in Panel D. The independent variables are: *Exclusion*, a dummy indicating if a company is on the exclusion list of asset owners due to its negative impacts; *Thematic*, a dummy indicating if a company is included in sustainable thematic portfolios; *DNSH violation*, a dummy indicating if a company is violating the EU Taxonomy's do-no-significant-harm criteria; and *Aligned revenues*, the percentage of company revenues that is aligned with the EU taxonomy. Each column contains the results for one regression. Columns (1) to (4) do not include control variables. Columns (5) to (8) include *Sector*, *Region*, *Size*, and *Company Fundamentals* as controls. ***, ** and * denote significance at the 0.01, 0.05 and 0.1 level, respectively.